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EXAMINER

MORAN, MARJORIE A

ART UNIT PAPER NUMBER

1631

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Please find below and/or attached an Office communication concerning this application or proceeding.



***Election/Restrictions***

Applicant's election with traverse of Group II, claims 3-21, in the reply filed on 1/3/06 is acknowledged. The traversal is on the ground(s) that the claims of all Groups recite "similar subject matter," therefore a search for all groups would be only "slightly more burdensome" than searching a single group. This is not found persuasive because the examiner maintains that the claims are patentably distinct for the reasons previously set forth. It is noted that applicant does not argue that the Groups are not distinct, and specifically admits in the response that there is a burden of search, albeit argued to be "slight," to search more than a single Group. As a search for any single Group requires a search of nonpatent literature and foreign patents in addition to US patents and publications, the examiner maintains that a search for more than a single Groups would be burdensome. Applicant is assured, however, that upon determination of allowability of the elected method claims, rejoinder with regard to claims directed to the product made and/or a method of use of the product made will be considered.

The requirement is still deemed proper and is therefore made FINAL.

Claims 1-2 and 22-37 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected Invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 1/3/06.

***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. It is noted that a translation of the priority document has not been filed as of the date of this office action. As the examiner can not determine whether the priority document fully supports the claimed subject matter in the absence of a translation, priority for the elected claims is granted only to the filing date of the instant application, of 6/19/03.

***Information Disclosure Statement***

The IDS filed 6/19/03 has been considered in full.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites "using" DNA strands in line 3 and "using" carbon nanotubes in line 4. Claim 5 recites "using" DNA strands in line 6. Claim 10 recites "using" a functional group. It is unclear what active method step or steps are intended to be encompassed by the "using" limitations recited, therefore claims 3, 5 and 10 are

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indefinite. Claims 4 and 6-21 depend from claims 3 and 5 and are therefore also indefinite.

Claim 3 recites the phrase "and connection elements..." in lines 3-4. It is unclear what previous limitation or step is intended to comprise "and connection elements..."; i.e. creating a molecular memory as in lines 2-3, or the step of making memory elements as in line 3, or "using" DNA strands, also in line 3, the claim is indefinite.

Claim 4 recites a step of "hybridizing...DNA strands", but does not recite what they are to be hybridized with or to; i.e. each other, a strand from another device, DNA is solution of in a sample, etc. As the intended "partner" for the hybridization step is unclear, the claim is indefinite.

Claim 5 recite the phrase "will be suitable" in line 5 as part of an intended result for a method step. Use of the phrase "will be" renders it unclear whether applicant intends to positively and definitely limit the functionalized nanotubes to have the recited property. If so, then this rejection may be overcome by replacing "will be" with --are-- in line 5.

Claim 5 recites hybridizing or nor hybridizing DNA "according to" information that is to be stored. This is confusing. It is known in the art that conditions such as salt, temperature, DNA length, etc. affect hybridization, therefore one skilled in the art MAY perform hybridization under (i.e. "according to") selected or calculated hybridization conditions. However, those skilled in the art do not generally hybridize oligonucleotides "according to" information to be stored/contained within the DNA molecule. It is unclear

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what parameters and/or information is to be considered in order to hybridize "according to" future/stored information, therefore the claim is indefinite.

Claim 8 recites the phrase ", making use of a manipulator". It is unclear what step or steps are to be performed "making use of a manipulator", therefore the claim is indefinite. For example, it is unclear whether the "use" of a manipulator a separate step from that of arranging individual nanotubes, or whether the step of arranging nanotubes is intended to be one performed by a manipulator, or whether the entirety of claims 5 and 8 (and possibly parent claim 3) are to be performed with a manipulator.

Claim 11 limits a functional group to be one which "derives from" benzyne. Claim 11 further recites "derivatives" of benzyne. It is unclear what limitation of benzyne or the functional group is intended. The specification does not define a "derivative" and one skilled in the art would not know the metes and bounds intended by applicant for a "derivative" of benzyne, therefore claim 11 is indefinite.

Claim 13 limits functionalization to "be performed locally." It is unclear what is intended to be "local" on a nanotube, therefore claim 13 is indefinite.

Claim 17 recites "contacting" first nanoelectrodes and DNA strands, but does not recite what the electrodes and DNA are to be contacted WITH. As the limitations intended by applicant is unclear, the claim is indefinite.

Claim 17 recites the limitation "said first nanoelectrodes" in line 2. There is insufficient antecedent basis for this limitation in the claim. Parent claim 3 recites does not recite any nanoelectrodes.

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Claim 20 recites the limitation "the non-hybridized DNA strands" in line 2. There is insufficient antecedent basis for this limitation in the claim. Parent claim 3 does not recite any non-hybridized DNA strands.

Claim 21 recites the limitation "said hybridized DNA strands" in line 2, the phrase "said non-hybridized DNA strands" in line 2, the phrase "said array of second nanoelectrodes" in line 3, and the term "said amide bond" in line 4. There is insufficient antecedent basis for these limitations in the claims. Parent claim 3 does not recite hybridized DNA strands, an array of any kind, or an amide bond.

Claim 21 recites "contacting" hybridized DNA strands and non-hybridized DNA strands, but does not recite what the different DNA strands are to be contacted WITH. As the limitations intended by applicant is unclear, the claim is indefinite.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 3 and 17 are rejected under 35 U.S.C. 102(a) and (e) as being anticipated by WATANABE et al. (US 6,486,489).

WATANABE teaches a method of making a memory device (transistor) comprising depositing DNA on a support and connecting the DNA to nanotubes (col. 7, lines 26-40), thereby anticipating claims 3 and 17.

Claims 3-9, 13-14, and 16-19 are rejected under 35 U.S.C. 102(e) as being anticipated by KELLEY et al. (US 6,958,216, filed 1/10/2001).

KELLEY teaches manufacture of a memory/sensing device (nanocircuits) comprising growing nanotubes by a chemical vapor deposition method (col.15, lines 15-23), optionally on a metallic growth catalyst site (col. 15, lines 50-65), derivatizing the nanotubes to produce carboxylic acid groups, or by addition of thiol groups (col. 16, lines 26-36), and attaching DNA (col. 16, lines 40-52), thereby anticipating claims 3 and 17. KELLEY further teaches both precluding DNA from becoming hybridized (col. 13, lines 26-29) and addition of complementary strands (col. 14, lines 33-38), thereby inherently teaching hybridization and “not hybridizing” depending on the desired condition of the device, and anticipating claims 4-9, 13-14, and 16. KELLEY teaches that introduction of a complementary sequence will create a molecular bridge (col. 14, lines 32-36), thus inherently teaching an “open” and “closed” configuration, corresponding to “0” and “1” and thus anticipating claims 18-19.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:



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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10, 15, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over KELLEY et al. (US 6,958,216, filed 1/10/2001), as applied to claims 3-9, 13-14, and 16-19, above.

KELLEY teaches a method of making a memory device, as set forth above. KELLY teaches that substituents for connecting DNA and nanotubes may include alkanes and alkylamines (col. 15, lines 45-48) or a thiophenol (col. 18, lines 41-45), but KELLEY does not specifically teach a washing step or derivatization of nanotubes with an alkyl chain or alcohol.

It would have been obvious to one of ordinary skill in the art at the time of invention to have washed the device of KELLEY to remove non-hybridized strands where the motivation would have been to preclude non-hybridized strands from becoming hybridized after attachment to a substrate, as taught by KELLEY (col. 13,

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lines 23-38). It would further have been obvious to have derivatized/protected nanotubes with any of the groups taught by KELLEY where the motivation would have been to provide appropriate linkers for anchoring DNA to nanotube substrates, as taught by KELLEY (col. 5, lines 11-14).

Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over KELLEY et al. (US 6,958,216, filed 1/10/2001) as applied to claims 3-10, 13-15, and 16-20 above, and further in view of BRADSHER, C. ([AccessScience@McGraw-Hill](mailto:AccessScience@McGraw-Hill) (2000)).

KELLEY teaches and makes obvious a method of making a memory device, as set forth above. KELLEY does not teach a Friedel-Crafts reaction using a benzyne derivative.

BRADSHER teaches Friedel-Crafts reactions using aromatic hydrocarbons (p. 1)

It would have been obvious to one of ordinary skill in the art at the time of invention to have derivatized nanotubes in the method of KELLEY using a Friedel-Crafts reaction, as taught by BRADSHER, where the motivation would have been to have obtained good yields of monosubstituted products, as taught by BRADSHER (p. 1).

### ***Conclusion***

Claims 3-21 are rejected; claims 1-2 and 22-37 are withdrawn.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marjorie A. Moran whose telephone number is (571)

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272-0720. The examiner can normally be reached on Mon,Wed: 7-1:30; Tue,Thur:  
7:30-6; Fri 7-3:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ardin Marschel can be reached on (571)272-0718. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Marjorie A. Moran  
Primary Examiner  
Art Unit 1631

*Marjorie A. Moran*  
4/3/06